US009636655B2

(12) **United States Patent**
Ludwig

(10) **Patent No.: US 9,636,655 B2**
(45) **Date of Patent: *May 2, 2017**

(54) **SOFTWARE-RECONFIGURABLE CONDUIT AND REACTION CHAMBER MICROFLUIDIC ARRANGEMENTS FOR LAB-ON-A-CHIP AND MINIATURE CHEMICAL PROCESSING TECHOLOGIES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 32 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/314,170**

(22) Filed: **Dec. 7, 2011**

(65) **Prior Publication Data**

US 2012/0094366 A1 Apr. 19, 2012

Related U.S. Application Data

(62) Division of application No. 11/946,678, filed on Nov. 28, 2007, now Pat. No. 8,594,848.
(Continued)

(51) **Int. Cl.**
B01J 19/00 (2006.01)
B01L 3/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***B01J 19/0093*** (2013.01); ***B01L 3/502715*** (2013.01); *B01J 2219/00835* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC B01J 19/0093; B01J 2219/00871; B01J 2219/00873; B01J 2219/00905;
(Continued)

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(57) **ABSTRACT**

Systems and methods for software-reconfigurable chemical process systems useful in a wide range of applications. Embodiments may include software control of internal processes, automated provisions for cleaning internal elements with solvents, provisions for clearing and drying gasses, and multitasking operation. In one family of embodiments, a flexible software-reconfigurable multipurpose reusable "Lab-on-a-Chip" or "embedded chemical processor" is realized that can facilitate a wide range of applications, instruments, and appliances. Through use of a general architecture, a single design can be economically manufactured in large scale and readily adapted to diverse specialized applications. Clearing and cleaning provisions may be used to facilitate reuse of the device, or may be used for decontamination prior to recycling or non-reclaimed disposal. In other embodiments, a flexible software-reconfigurable multipurpose reusable laboratory glassware setup may be realized, sparing talented laboratory staff from repetitive, complex, or low-level tasks occurring in analysis, synthesis, or smallscale chemical manufacturing.

23 Claims, 63 Drawing Sheets